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UNITED STATES DEPARTMENT OF AGRICULTURE  
WAR FOOD ADMINISTRATION  
Office of Distribution

COTTON FIBER AND SPINNING TESTING SERVICE 1/

The various tests available under the Cotton Fiber and Spinning Testing Service Act of April 7, 1941, are described herein in order to acquaint cotton breeders, producers, merchants, manufacturers, and others who may utilize the service with the methods employed in making the tests, and with the significance of the results. A complete list of the tests available and the schedule of fees are shown in a companion publication entitled "Regulations Governing Cotton Fiber and Spinning Tests Under the Act of April 7, 1941, (Promulgated September 11, 1944)."

Location of Laboratories and Procedure of Requesting  
Testing Services

The Cotton and Fiber Branch operates testing laboratories at the following locations: Washington, D. C.; Clemson, S. C.; Stoneville, Miss., and College Station, Tex.

The special equipment required for the various tests and the high degree of skill required for accurate results have made it advisable to provide a certain amount of specialization at the various laboratories. At present, all tests made by the Fibrograph and the Pressley fiber strength tester are performed at the Stoneville, Miss., laboratory. All fiber cross-sections and X-ray tests are made at the Washington, D. C., laboratory. This laboratory also performs all other fiber tests except fibrograph and flat bundle strength tests. The laboratory at College Station, Tex., is equipped for carded yarn spinning tests, skein and single strand yarn tests, tire cord tests, and for the following fiber tests: Strength, by the round bundle method; length arrays; fineness, and maturity. The Clemson laboratory also performs the same tests as well as all combed yarn spinning tests. Both the Clemson and College Station laboratories perform Shirley Analyzer tests. All weaving is done at the Clemson laboratory.

The scheduling of tests and the supervision and coordination of the work of the various laboratories are conducted from Washington, D. C. Therefore, where feasible and for most expeditious

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1/ This publication revises and supplements the publication entitled "Cotton Fiber Testing Service," issued in 1941 by the former Agricultural Marketing Service.

service, requests for testing and other inquiries concerning tests should be addressed to the Washington office as follows;

Cotton and Fiber Branch  
Office of Distribution  
War Food Administration  
Washington, 25, D. C.

The Washington office will issue instructions as to which laboratory the test samples should be sent. If desired, however, requests may be made directly to the laboratory nearest the applicant and a single set of test samples sent to that laboratory. Samples for tests to be performed at other laboratories will be prepared and forwarded by the laboratory receiving the samples.

All inquiries concerning policies or the broad interpretation of test results should be addressed to the Washington office. Questions concerning specific test results may be addressed to the laboratory preparing the report on such tests.

#### Selection and Preparation of Samples

The results of the fiber and spinning tests can be no more reliable than the samples themselves, so that the proper size, selection, and preparation of samples are extremely important. The following suggestions relative to the selection and preparation of samples are designed to aid applicants for testing services in obtaining the most reliable results possible:

Size. - 8 ounces or more for fiber tests  
5 pounds or more for carded yarn spinning test  
8 pounds or more for combed yarn spinning test

Selection. - In view of the high degree of variability found for all the measurable properties of cotton within a bale or even within a small sample, it is very important that care be exercised in selecting the fibers which are actually to be tested. Otherwise, the test specimens may not be truly representative, and a false impression will be obtained of the cotton being tested.

In the case of breeders' samples, the seed cotton to be ginned should be representative of the block. It should be mixed thoroughly before ginning, and preferably the sample should be drawn from approximately the midpoint in the ginning process. Saw-ginned lint for upland cottons is preferred, as it is not possible to obtain an accurate grade designation for such cotton on roller-ginned samples. It is inadvisable to submit samples that have been weather damaged, as the lint may no longer be representative of the particular lot of cotton being studied.



Where spinning tests are to be made from commercial bales and other relatively large supplies of lint, the samples should be composed of equal amounts of cotton taken from a number of places in the bale. In cases where a spinning test sample is to represent a "mix," equal quantities of cotton should be selected from each bale in the "mix," unless otherwise desired by the applicant.

### Description and Interpretation of the Tests

#### Ginning

Ginning of test sample. (1) 2/ - This test includes the weighing and ginning of sufficient seed cotton to produce from 6 to 10 pounds of lint. The ginning is performed on a saw gin equipped with an extractor cleaner feeder. The lint and seed are both weighed and reported along with the percentage of lint turn-out. When spinning tests are to be made on the ginned lint, the ginning laboratory selects, packages, marks, and ships the test sample to the designated spinning laboratory. If the applicant requests it, the cottonseed will be returned to him at his expense.

#### Fiber Tests

All fiber tests, with the exception of the X-ray and cross-section tests, are conducted under standard atmospheric conditions of 70 degrees F. and 65 percent relative humidity, after the samples have been conditioned for 4 hours or more.

Fiber length array. (2) - This test is made with the Suter-Webb fiber sorter. Briefly, a weighed sample of fibers is parallelized through a series of combs, and the fibers separated and arrayed according to length. The different length groups, at 1/8-inch intervals, are measured and weighed to obtain the three values reported, as follows; Upper quartile length, mean length, and coefficient of length variation. Upper quartile length is the length which is exceeded by 25 percent of the fibers by weight in the sample. It is usually closely related to but slightly longer than the classer's staple length designation. Its relationship to that value may vary, however, because of fiber characteristics other than length which may be taken into account by the classer. Mean length is the average length of all the fibers in the sample, as determined from the weight-length data. Coefficient of length variation is a measure of the variability of fiber length in the

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2/ Numbers in parentheses refer to test numbers as shown in the published schedule of tests referred to in the first paragraph on page 1.

sample and represents the standard deviation of the weight-length frequencies expressed as a percent of the mean length. The smaller the figure, the more uniform are the fiber lengths. Excessive variation in fiber length tends to increase manufacturing waste, makes processing more difficult, and tends to lower the quality of the product. It is, therefore, considered desirable for a cotton to have a low coefficient of variation. Comparisons between samples may be made according to the following descriptive designations:

Coefficient of fiber length variation

Below 27	Low variability
27 - 34	Average variability
35 and above	High variability

For those desiring more complete data for the purpose of plotting fiber length array curves or for more detailed study of length distribution, test (2a) has been provided. In addition to the three values reported in test (2), this test includes the percent of fibers by weight in each 1/8-inch length group.

Test (2b) is designed to provide detailed data required in connection with the U. S. Pharmacopoeia standards for Purified or Absorbent cotton. It involves the preparation of fiber length arrays on the Suter-Webb sorter, and the determination of the percentages of fiber which are (a) 1/2-inch long and longer, (b) 1/4 inch and shorter in length, and (c) of the intermediate lengths, in keeping with procedures specified in the Second Supplement to the Pharmacopoeia of the United States of America.

All fiber sorter values reported represent averages of three arrays which have been found to be required for reliable results.

Fiber length (fibrograph). (3 and 3a) - These tests provide measures of fiber length as determined by the fibrograph which is a photoelectric device for measuring the length and length distribution of the fibers in a sample of cotton. The "upper half mean length," as determined by this instrument provides a measure of the average length of all fibers longer than the mean length, expressed in terms of decimal fractions of an inch. Although the "upper half mean length" is closely related to the classer's designation of staple length, it may vary from that value because of fiber characteristics other than length which may be taken into account by the classer. Mean length is the average length of all fibers in the sample, excluding those shorter than 1/4 inch.



The "uniformity ratio," expresses the relation between the mean length of the fibers and the upper half mean length, and provides a relative measure of the length uniformity of the fibers. The larger the figure reported, the more uniform the fiber length. For practical purposes, comparisons between samples may be made according to the following descriptive designations:

Uniformity ratio

Above 80	Uniform in fiber length
76 - 80	Average uniformity
71 - 75	Slightly irregular in fiber length
70 and below	Irregular in fiber length

The uniformity ratio as determined from fibrograph data is not strictly comparable with coefficient of variation based on the sorter array. The latter is based on all fibers in the sample whereas the fibrograph disregards fibers shorter than 1/4 inch.

All fibrograph values reported are based on five determinations which have been found necessary for reliable results.

Fiber strength (round bundle). (4) - This test is conducted by hand-combing a small tuft of fibers into a parallel strand, wrapping them into a compact bundle of known circumference, and breaking the bundle in a testing machine. The results are expressed in tensile strength of 1,000 pounds per square inch. The fiber tensile strength reported is based on the average results obtained from 10 successful breaks which have been found necessary for reliable results.

Fiber strength is a very important factor in determining yarn strength. Cottons with good fiber strength give less trouble in spinning than weak-fibered cottons. The following designations will serve to facilitate comparisons between cottons;

Fiber strength  
(1,000 pounds per square inch)

90 or more	Excellent
83 - 89	Very good
78 - 82	Average
72 - 77	Fair
Below 72	Weak

Fiber strength (flat bundle). (5 and 5a) - An alternate method of determining the fiber strength is afforded by the Pressley strength tester. In making this test, the cotton is

combed and parallelized, but instead of being wrapped into a round bundle, the fibers are placed in a set of breaking clamps in the form of a flat ribbon about 1/4-inch wide. The fibers are cut to a definite length, broken in the Pressley tester, and then weighed. The quotient obtained by dividing the breaking load in pounds by the weight in micrograms of the fibers affords the strength index. Because of the general knowledge of the round-bundle test data, the index is converted into tensile strength of 1,000 pounds per square inch. The data may then be classified and interpreted as for the round-bundle test. Test results reported are based on an average of six breaks which have been found necessary for reliable results. At present, this type of fiber-strength test is not recommended for American-Egyptian, sea-island, or extra-long staple upland cottons. Pending the development of a more satisfactory conversion formula, the Chandler round-bundle method is recommended for these cottons.

Fiber fineness (weight per inch) and maturity. (6) - In making these tests, a fiber-length array is first made. For the fineness test, 100 fibers are extracted from each 1/8-inch length group of the array, and are weighed. The average weight per inch of fiber in the sample is then calculated and expressed in terms of micrograms per inch of fiber. The larger the figure reported the coarser the fibers, and, conversely, the lower the figure the finer the fibers. As a general rule, long cottons are fine-fibered and short cottons coarse-fibered. In general, fineness contributes to yarn strength. Very fine fibers, however, tend to increase neppiness and to reduce the rate of processing, so that the desirability of fiber fineness depends upon the specific end product or use. For American upland cottons of medium- and short-staple lengths, the following adjective ratings may be applied for purposes of comparison;

Fiber fineness (Micrograms per inch of fiber)	
Below 4.0	Fine
4.0 - 4.9	Average
5.0 - 5.9	Slightly coarse
6.0 and above	Coarse

A false impression of inherent fineness is frequently imparted by highly immature cottons, and for this reason a measure of maturity is almost a necessity in evaluating cottons on the basis of their fiber weight. Fiber maturity is determined by examining 100 fibers from each 1/8-inch length group of the array under high-power magnification to determine the relative thickness of the fiber cell walls after the fibers have been treated with an



18 percent solution of sodium hydroxide. For the most part, thick-walled fibers indicate high maturity, while thin-walled fibers indicate immaturity. Although thickness of cell wall is to some extent a varietal characteristic, this property varies significantly with growth conditions. It is closely related to yarn appearance, as, generally speaking, the more mature cottons tend to produce smoother yarns with fewer neps. The following descriptive terms may be applied:

Fiber maturity  
(Percent)

Above 84	Very mature
77 - 84	Mature
68 - 76	Average
60 - 67	Immature
Below 60	Very immature

Test results reported are based on an average of two determinations which have been found necessary for reliable results.

Fiber cross-section. (7) - In this test a very thin cross-section of a small tuft of fibers is prepared by hand, and placed on a glass slide. A photomicrograph of the fibers magnified 1,000 times is made, which provides a picture of the cross-sections of the fibers. Measurements are then made of 200 fibers, and from these measurements, the average fiber "diameter" and wall thickness, in microns, and the circularity ratio are calculated. These values are reported along with a print of the photomicrograph.

In these calculations, the "diameter" of a fiber is assumed to be one-half the sum of the long axis and the short axis of the fiber cross-section. The circularity ratio is the ratio of the long axis to the short axis of the fiber, and the wall thickness is one-half the difference of the over-all width less the lumen width. These measurements, and their coefficients of variation, provide measures of the cross-sectional characteristics not obtainable in any other way.

Cellulose alignment (X-ray method). (8) - Fiber structure, as determined from the X-ray diffraction pattern for a specimen of fibers, represents the average angle between the long axis of the cellulose crystallites and that of the fiber. The X-ray angle has been found to be closely correlated with the strength of cotton fibers that have not been subjected to material deterioration. Although the X-ray angle is very largely a varietal characteristic,

it is influenced significantly by growth conditions. Descriptive terms as applied to the X-ray angles of upland cotton are as follows;

#### X-ray angle

Degrees	Fiber structure
30 and below	Excellent
31 - 33	Very good
34 - 36	Average
37 - 39	Fair
40 and above	Poor

Test results reported are based on an average of two determinations which have been found necessary for reliable results.

#### Spinning Tests

In the final analysis, the actual results obtained in processing different samples of cotton provide the most satisfactory basis for evaluating their relative merits. Laboratory equipment and techniques have now been developed to a point that reliable results can be obtained from small samples of cotton.

Spinning tests provided (11, 12, and 13) are for carded yarns, combed yarns, and a combination of both, respectively. In commercial practice, most cottons 1-1/8 inches and longer are manufactured into combed yarns. Although considerable cotton shorter than 1-1/8 inches is used for combed yarns, the major portion of it is used for carded yarns. Applicants for spinning tests should indicate in each instance whether carded, combed, or the combination test is desired.

Spinning tests are conducted on commercial-type cotton-manufacturing machinery by use of standardized procedures and techniques which have been developed to insure reproducible results. At present, only regular draft-roving processes are available, but it is planned in the near future to install long-draft roving as well. Both regular- and long-draft spinning frames are in use. The customary manufacturing organization for carded-yarn spinning tests includes two processes of picking, both of which are performed on a finisher picker, conventional carding, two processes of drawing, three roving processes, and regular-draft spinning. For combed yarn tests, the same processes are used with the addition of the sliver and ribbon lappers and the comber. The applicant may specify the percentage of comber waste to be removed, but if none is requested, the standard procedure of the laboratory will be followed.



Three yarn counts are spun for all tests to provide comprehensive data in terms of a relatively wide range. In order to be able to interpret specific test results on the basis of research and other data accumulated over a period of years, certain yarn counts have been adopted as standard. For cottons not in excess of 1-1/4-inch staple, 22s yarn is spun in all instances. A second count may be designated by the applicant from the following standard counts; 14s, 36s, 44s, 50s, or 60s. The applicant may designate as the third count to be spun any count within the spinnable range of the cotton.

For cottons longer than 1-1/4 inches, 60s is the standard yarn count spun in all instances. The applicant may designate either 80s or 100s as the second standard count. As the third count, any count within the spinnable range of the cotton may be designated by the applicant.

The standard counts are spun on the regular-draft spinning frame with the optimum twist multiplier for the staple length but the applicant may designate any twist desired for the third count as well as regular- or long-draft spinning.

The following tabulation shows the yarn counts usually spun and the twist multipliers employed for cotton of the various staple lengths;

Staple length; (inches)	Yarn counts spun			Twist multiplier 1/
	Low	Medium	High	
3/4 . . . .	14s	22s	36s	5.35
25/32 . . . .	14s	22s	36s	5.15
13/16 . . . .	14s	22s	36s	5.00
27/32 . . . .	14s	22s	36s	4.85
7/8 . . . .	22s	36s	44s	4.70
29/32 . . . .	22s	36s	44s	4.60
15/16 . . . .	22s	36s	50s	4.45
31/32 . . . .	22s	36s	50s	4.35
1 . . . .	22s	36s	50s	4.25
1-1/32 . . . .	22s	36s	60s	4.20
1-1/16 . . . .	22s	36s	60s	4.10
1-3/32 . . . .	22s	36s	60s	4.05
1-1/8 . . . .	22s	36s	60s	3.95
1-5/32 . . . .	22s	36s	60s	3.90
1-3/16 . . . .	22s	36s	60s	3.85
1-7/32 . . . .	22s	36s	60s	3.80
1-1/4 . . . .	22s	36s	60s	3.75
1-9/32 . . . .	60s	80s	100s	3.70
1-5/16 . . . .	60s	80s	100s	3.65

1/ Based on fibrograph upper half mean.



The spinning test reports show the following data; Grade and staple length classification of the cotton; percentage of picker and card wastes broken down into the respective types of waste, combing wastes where combed tests are made, nep count in the card web, yarn skein strength, strength indexes, equivalent staple length, and yarn appearance grades. A summary of notes and observations made throughout the various stages of manufacture is also included. Where fiber tests have also been requested, an analysis is made of the spinning test results as related to the various fiber properties of the raw cotton. Inspection boards for each yarn count spun are furnished with spinning test results.

#### Evaluation of Spinning Test Results

In evaluating results of fiber and spinning tests, too much significance should not be attached to small differences shown for individual tests. In practical application, it should be remembered that a small difference in a single measurable property may be overshadowed by other properties. Conclusions, therefore, should be made only after consideration of all test results.

The results of tests conducted on more than 1,300 lots of cotton provide the following bases for the evaluation of specific test results;

Grade and manufacturing waste. - Grade provides an indication of waste content of a sample of cotton. Although, for individual samples, the waste removed in processing is not always higher for the lower grades, past experience has shown the average relationship between grade and manufacturing waste to be approximately as follows;

Grade	Average picker and card waste (Percent)
Good Middling	6.3
Strict Middling	7.2
Middling	8.0
Strict Low Middling	9.2
Low Middling	11.8
Strict Good Ordinary	14.0
Good Ordinary	16.5

In comparing these average grade figures with the picker and card waste data, it should be understood that variations from the averages for individual samples are attributable to the nature of the extraneous material present in the cotton, to the characteristics of the fiber, and whether the grade designation was low because of poor color.

Nep count. - A desirable feature of any cotton is its freedom from neps. If, therefore, the nep count is high, the cotton is deficient in this respect and is likely to produce rough and neppy yarns, as there is a relation between yarn appearance and nep count. Excessive neppiness limits the uses for which the cotton is suitable. The following adjective descriptions will serve to classify cottons from the standpoint of neppiness.

Number of neps per  
100 square inches of card web

1 - 15	Low
16 - 25	Average
26 - 40	High
Above 40	Very high

Yarn strength. - Probably the most important and most reliable single index of spinning quality is the yarn strength. Good yarn strength not only increases the range of usefulness of a given cotton but it is also an indication of good spinning and weaving performance. From the standpoint of strength, 22s and 36s yarn may be classified as follows:

#### Yarn skein strength

	22s	36s
Excellent	Above 110 lbs.	Above 63 lbs.
Very good	101 - 110	58 - 63
Average	93 - 100	51 - 57
Fair	85 - 92	45 - 50
Poor	Below 85	Below 45

Yarn skein strength results reported are based on an average of 25 breaks which have been found necessary for reliable results.

Yarn strength index. - The strength index represents the ratio between the yarn strength of a particular cotton under test and the strengths calculated from a formula derived from the average strengths of yarns tested in the laboratories over a period of years. The calculated average skein strengths for various counts of carded yarn and classer's staple lengths are given in tabular form as follows:

Classer's :	:	:	:	:	:	:
staple	22s	28s	36s	44s	50s	60s
length	:	:	:	:	:	:
Inches	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
3/4 . . . . .	74.5	54.6	38.5	-	-	-
25/32 . . . . .	77.5	57.0	40.3	-	-	-
13/16 . . . . .	80.6	59.4	42.2	31.2	25.3	-
27/32 . . . . .	83.6	61.8	44.0	32.7	26.6	-
7/8 . . . . .	86.7	64.2	45.9	34.3	28.0	20.3
29/32 . . . . .	89.7	66.6	47.8	35.8	29.3	21.4
15/16 . . . . .	92.8	69.0	49.6	37.3	30.6	22.5
31/32 . . . . .	95.8	71.4	51.5	38.8	32.0	23.6
1 . . . . .	98.8	73.8	53.4	40.4	33.3	24.8
1-1/32 . . . . .	101.9	76.2	55.2	41.9	34.7	25.9
1-1/16 . . . . .	105.0	78.6	57.1	43.4	36.0	27.0
1-3/32 . . . . .	108.0	81.0	58.9	44.9	37.4	28.1
1-1/8 . . . . .	111.0	83.4	60.8	46.4	38.7	29.2
1-5/32 . . . . .	114.1	85.8	62.7	48.0	40.0	30.3
1-3/16 . . . . .	117.1	88.2	64.5	49.5	41.4	31.5
1-7/32 . . . . .	120.2	90.5	66.4	51.0	42.7	32.6
1-1/4 . . . . .	123.2	92.9	68.2	52.5	44.1	33.7
1-9/32 . . . . .	126.3	95.3	70.1	54.1	45.4	34.8
1-5/16 . . . . .	129.3	-	-	55.6	-	35.9

For yarn counts not shown, the following formula may be applied

$$S = \frac{428.69 + 2145.18 L - 18.142C}{C}$$

wherein S = Skein strength

L = Classer's staple length in inches

C = Yarn count

In general, the strength figures shown are above those obtained in commercial mills. This is explained by the fact that the laboratories are staffed by well-trained personnel and processing machinery is kept in excellent condition. Furthermore, the laboratory results are, for the most part, based on pure varieties of cotton.

Equivalent staple length. - The equivalent staple length reported in each instance is the staple length generally required to produce the yarn strengths equal to those obtained from that particular sample. If the length shown for a given cotton is greater than the classer's length designation then that particular



sample is above average strength for that staple length. If the equivalent staple length is lower, the reverse is true. For example, if for a given test sample of cotton classed as 1 inch in staple length, yarn strengths of 105 pounds for 22s, 57 pounds for 36s, and 36 pounds for 50s yarn were obtained, the equivalent staple length would be 1-1/16 inches because, on the average, cottons classed as 1-1/16 inches in staple length produce yarn of these respective strengths. (See tabulation under "Yarn strength index" on page 12.)

The equivalent staple length may be calculated from the following formula;

$$L = \frac{SC - 428.69 + 18.142C}{2145.18}$$

wherein L = the equivalent staple length to be calculated  
S = the yarn skein strength obtained in the test  
C = the yarn count spun

Yarn appearance. - The appearance of the yarn in many types of woven or knitted materials is a very important factor, and is expressed in these tests through the medium of yarn appearance grades adopted by the American Society for Testing Materials. The following descriptive designations will be helpful in evaluating the results reported;

#### Yarn appearance grade

A and above	Excellent
A- and B+	Very good
B	Good
B- and C+	Average
C	Fair
C- and D+	Poor
D and below	Very poor

#### Other Tests

Spinning and testing additional counts of yarn. (20) - In the event the three yarn numbers provided in connection with spinning tests are not adequate for the specific purposes of an applicant, provision is made for the spinning of any extra counts desired so long as they are within the spinnable limits of the cotton. Yarn skein strength and appearance grade are included in this test.

Plied yarn. (21) - This test, which is made only in connection with spinning tests, includes the twisting and the testing of 2-ply or 3-ply yarns. The yarn strength is determined and reported in accordance with the specifications of the American Society for Testing Materials.

Tire cord test. (22) - This test is offered only in conjunction with and as a supplement to a spinning test. Although it is fully recognized that 23s/5/3 tire cord offered in this test is no longer a standard construction, it does afford a convenient medium for studying the results obtained for different cottons in plied and cabled materials. Furthermore, the basic data available with respect to this construction provide a basis for evaluating results for individual tests. These tests are conducted according to the procedures adopted by the American Society for Testing Materials.

Yarn skein strength, size, and appearance grade. (23) - This test affords a means for a cotton manufacturer to compare yarns processed in his own mill from cottons submitted for laboratory spinning tests with yarns processed at the Government laboratory. The test includes the reeling, conditioning, breaking, and sizing of 25 skeins from the bobbins submitted as representative of a given lot of yarn, and the preparation and grading of one yarn appearance board. The test report furnished includes average skein strength, average yarn count, appearance grade, and one yarn board.

Moscrop single strand yarn strength test. (24) - The Moscrop is a single strand strength testing machine which accommodates 6 bobbins at one time. It automatically threads and breaks the yarn and records the strength autographically on a special recording chart for a minimum of 36 successive 10-inch lengths from each bobbin. The average observed breaking strength for each bobbin, and for the lot, is reported in ounces. The actual size of the yarn, obtained by reeling and sizing one skein from each of the 6 bobbins, is also reported.

Shirley Analyzer test. (25 and 26) - In this test, a weighed sample of lint, mill waste, or linters is fed into the machine and an almost perfect separation of lint and trash is made. The report furnished shows the weight fed, fiber delivered, visible and invisible loss, and percentage of total loss. Shirley Analyzer waste is distinguished from total picker and card waste in the fact that practically no fiber is included in the waste as in the usual mill cleaning machines. Since not only lint but various mill wastes can be analyzed, the test is useful for a number of research purposes. If specifically requested, the cleaned lint and the trash removed are returned to the applicant for his inspection and use.



Based on tests made to date, the average percentage of waste removed by the Shirley Analyzer from different grades are as follows:

Grade	Average waste (Percent)
Striot Middling	4.2
Middling	4.5
Striot Low Middling	5.3
Low Middling	7.9
Striot Good Ordinary	9.5
Good Ordinary	9.7

Waste and nep count. (27 and 27a) - This test affords a means for comparing the relative wastiness and neppiness of different samples of cotton in the event it is not desired to make complete spinning tests. The cotton is processed through the pickers and card for cleaning and waste removal in the same manner as for spinning tests. Test 27 employing the small-lot technique, requires a 5-pound sample of cotton whereas test 27a for which the large-lot technique is employed, may include up to 50 pounds of cotton in the sample to be tested. The percentage of waste at each cleaning element is reported as well as the average nep count per 100 square inches of card web based on five determinations. (See "Grade and manufacturing waste" and "Nep count" under "Spinning Tests" (11, 12, and 13)).

The fabric strength test (29) is conducted according to the specifications of the American Society for Testing Materials for the grab test. The applicant should, therefore, furnish a sample 1-yard square, and including at least one selvage. It would also facilitate the test if the warp and filling directions were marked. From the piece submitted, five specimens of 4 x 6 inches each are cut from the warp and from the filling.

Fabric weaving and testing. (30) - This test is offered only as a supplement to spinning tests, and thus is only available with a spinning test. It includes the warping, slashing, and weaving of a fabric of the following nominal specifications;

Width . . . . .	11-3/4 inches
Construction . . . . .	68 x 72
Warp . . . . .	21s
Filling . . . . .	23.6s
Weight . . . . .	4.9 ozs. per yard

Extra copies of test report and data sheets (31 and 32) are available at the prices listed in the schedule of tests.



Relationship of Test Data to Published Reports

Users of the testing service are placed on the mailing list to receive publications issued from time to time dealing with various research studies and reporting test results for the improved varieties of cotton grown throughout the Cotton Belt and tested each year in connection with the Federal-State Cotton Improvement Program. The data reported in these publications provide a basis for comparison of the specific cottons submitted for test with the various improved varieties.